CLAIMS

1. Tire wear monitoring system, including a wearing part (110, 111) to be monitored, said wearing part (110, 111) being associated with magnetic elements (113) and magnetic field sensing means (114), for sensing an intensity of a magnetic field emitted by said magnetic elements (113), associated with said wearing part (113) of said tire, characterized in that said magnetic field sensing means (114) for sensing an intensity of a magnetic field emitted by said magnetic elements (113) are associated with a wheel to which said tire belongs.

2. System according to claim 1, characterized in that said magnetic field sensing means (114) for sensing an intensity of a magnetic field emitted by said magnetic elements (113) are associated with a rim of said wheel.

3. System according to claim 1, characterized in that said magnetic field sensing means (114) for sensing an intensity of a magnetic field emitted by said magnetic elements (113) are associated with the tire of said wheel.

4. System according to claim 3, characterized in that said magnetic field sensing means (114) for sensing an intensity of a magnetic field emitted by said magnetic elements (113) are inserted close to the wearing part (110, 113) of said tire.

5. System according to claim 3, characterized in that said magnetic field sensing means (114) for sensing an intensity of a magnetic field emitted by said magnetic elements (113) are applied to the internal part of said tire.

6. System according to claim 4, characterized in that said magnetic field sensing means (114) for sensing an intensity of a magnetic field emitted by

said magnetic elements (113) are located close to blocks (111) of said wearing part (110) of the tire.

7. System according to at least one of claims 1 to 6, characterized in that said magnetic field sensing means (114) include one or multiple sensors comprising magnetoresistive elements (10; 20) suitable for varying their resistance in correspondence with the intensity variation of the magnetic field generated by said magnetic elements (113).

8. System according to claim 7, characterized in that said magnetoresistive element (20) includes metal conduction regions (13; 23), comprised of metal nanoparticles (37), and semiconductive conduction regions (11; 31) in a configuration of disordered mesoscopic structure.

9. System according to claim 7 or 8, characterized in that said magnetoresistive element (20) includes pores (12; 22) in a semiconductor substrate (11; 31), metal (13; 23) being deposited in said pores (12; 22).

10. System according to one or more of the preceding claims, characterized in that said magnetic elements (113) are substantially located in correspondence with blocks (113) of said wearing part (110).

11. Monitoring system of the physical properties of a tire, characterized in that it includes a control unit (56) in a signal communication relation with sensing means (113, 114; 60, 61, 62) of said physical properties and conversion means of the energy associated with the tire motion, in particular of vibrational energy, in electric energy.

12. System according to claim 11, characterized in that said sensor means (113, 114) of physical properties include the magnetic elements (113) and the

magnetic sensing devices (114) configured according to the system according to claims 1 to 10.

13. System according to claim 11 or 12, characterized in that said sensing means (60, 61, 62) of physical properties include one or multiple magnetic sensing devices (61, 62) placed to predetermined distances (d1, d2) from a magnetic element (60) associated with a region of the tire (52) for measuring the pressure thereof.

14. System according to claim 13, characterized in that said magnetic sensing devices (61, 62) include one or multiple sensors including magnetoresistive elements (10; 20) suitable for varying their resistance in correspondence with the intensity variation of the magnetic field generated by the variation of said predetermined distances (d1, d2) from a magnetic element (60) associated with a region of the tire (52) for measuring the pressure thereof.

15. System according to claim 14, characterized in that said magnetoresistive element (20) includes metal conduction regions (13; 23), comprised of metal nanoparticles (37) and semiconductive conduction regions (11; 31) in a configuration of disordered mesoscopic structure.

16. System according to claim 15, characterized in that said magnetoresistive element (20) includes pores (12; 22) in a semiconductor substrate (11; 31), metal (13; 23) being deposited in said pores (12; 22).

The whole substantially as described and shown, and for the stated purposes.